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Poverty Profiles and Coping Strategies of the Haor (Ox-bow lake) Households in Bangladesh

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Abstract: The study examines the depth and severity of poverty and coping strategies of 4065 households from 30 haor (ox-bow lake) areas from six north-eastern districts of Bangladesh. Results revealed that 29.6% and 43.0% of the surveyed households were below the lower and upper poverty lines based on a Cost of Basic Needs (CBN) method. The depth of poverty was estimated at 7.6% and 12.4% and the severity of poverty at 3.0% and 5.2%, respectively based on lower and upper poverty line estimates, which were substantially higher than the national average for rural

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areas of Bangladesh. Poverty is relatively higher for the households characterized by landlessness, large family size, lacking durable assets, poor housing and sanitation, NGO membership, wage labor and illiterate heads. Loans from moneylenders and/or relatives, reduction of monthly expenditure and asset sale were the main coping strategies. Policy implications include land reform and tenurial policies aimed at smooth functioning of the land rental market; provision of collateral free credit; investments in employment and income generation activities; provision of skills training; targeted education programs and increased coverage of safety net programs in order to reduce poverty of these highly vulnerable haor residents.

Keywords: Haor (ox-bow) lake areas; poverty; severity of poverty, coping strategies; Bangladesh.

The UN Sustainable Development Summit held during September 25–27, 2015 in New York decided on a new set of 17 Sustainable Development Goals fit for the 21st century (i.e., SD21) to be achieved by 2030. These goals are to be implemented through 17 partnerships (one partnership for each goal) (United Nations 2015a), which is far more ambitious than the 8 Millennium Development Goals (MDG) that ended in 2015. As usual, the first of the 17 goals is centered on poverty, now specified as "Goal 1: End poverty in all its forms everywhere" (United Nations 2015a). Globally, extreme poverty has declined significantly over the last two decades as the proportion of poor living on less than $1.25 a day had dropped from nearly 50% in 1990 to 14% in 2015 (United Nations 2015b). Also, the number of people living in extreme poverty has declined by more than half, falling from 1.9 billion in 1990 to 836 million in 2015, with most progress occurred since 2000 (United Nations 2015b). Nevertheless, there are still large numbers of people living under the poverty line in Sub-Saharan Africa (51%), South Asia (40%) and East Asia (17%) (Krishna 2013).

Within South Asia, Bangladesh also has made considerable progress in improving the wellbeing of its population over the past decade. The Bangladesh MDG progress report launched in September 2015 noted that Bangladesh has made outstanding achievements with head count ratio of poverty estimated at 24.8%. This overshot the MDG1 target of 29% (PC 2015). Bangladesh is one of the most overpopulated countries in the world with 159.6 million people (BBS Live Population Clock on November 24, 2015) and is heavily dependent on agriculture (58.3% people directly dependent on it) with a mismatch of resources in terms of inappropriate use and distribution which leaves more than 60 million people living below the poverty line (Rajaretnam & Hallad 2000). However, within Bangladesh, there are large disparities in the distribution of poverty depending on location and geographic characteristics. For example, in 2010 population below the poverty line was as high as 63.7% of the total population in Kurigram, between 50–60% in Chandpur, Jamalpur, Mymensingh and Shariatpur and under 10% in Noakhali and Kushtia disticts (World Bank 2011). The situation is even worse in pockets of under-previleged areas, such as hill tract regions or low lying areas.

A haor (ox-bow lake) is a bowl-shaped large tectonic depression, which receives surface runoff water and consequently becomes a very extensive water body in the monsoon and dries up during the post-monsoon period. In Bangladesh, haors are mainly found in greater Sylhet and greater Mymensingh regions, with 783,939 hectares of arable land and about 5 million residents.[1] A micro-level study revealed that 47.7% of the fishermen of haor area live below the poverty line (Kazal et al. 2006) which is commensurate with the estimate of 50.5% for Mymensingh district (World Bank 2011). The basic avenues for seeking a livelihood are largely absent in the haor areas. People do not have regular employment. The majority of the people in the haor areas are

[1] Estimated by the formula = (Total population of haor containing sub-districts/Total area of these sub-districts) × Total areas of haors.

involved in two occupations, farming and fishing. A few are engaged in some other occupations, such as small-scale trading, and petty jobs in government and non-government organizations. The people engaged in farming and fishing remain frequently unemployed due to floods and other natural disasters resulting in poverty and food insecurity in these areas, which sometimes create famine-type situations. When no income is coming in, people survive by taking loans from money lenders at a high interest rates (Amin & Farid 2005). Household level poverty and food insecurity is accepted as part and parcel of everyday life and the people are often forced to depend on money lenders or food lenders for survival (Amin & Farid 2005).

These areas also do not enjoy good infrastructure and communication systems. There is hardly any concrete literature available on the strategies of the people living in the haor areas and the challenges of poverty they face. Given this dearth of information, the main objectives of this study were to: (a) estimate levels of poverty, its depth and severity of the households residing in the haor areas using a range of established methods; (b) examine the relationship between poverty levels and selected socio-economic factors; and (c) explore various coping strategies undertaken by the households. The main contribution of this study to the existing literature is that we have addressed the issues using a large sample covering all the six north-eastern districts of Bangladesh where haors are mainly located. The combination of quantitative and qualitative approaches applied enabled us to gain a detailed understanding of the relationships between poverty, socio-economic situation and coping strategies. It is expected that the results will facilitate policy-makers to take timely and viable steps and develop workable strategies to address the issue of poverty in these haor areas in line with the Government of Bangladesh's aim of improving the welfare of its people.

The paper is organized as follows. Section 2 presents the assessment methodology, the study areas and the data. Section 3 presents the results. Section 4 provides conclusions and draws policy

implications.

Methodology

Sampling strategy and the data

Information needed to adequately address poverty at the household level is complex. This study adopted a combination of quantitative and qualitative components to have an in-depth understanding of poverty status and coping strategies. The relevant data were collected from the six haor-dominated districts of Bangladesh: Sunamgonj, Sylhet, Moulvibazar, Habiganj, Kishoreganj and Netrokona.

The study applied cluster-sampling design where haor-attached villages were counted as clusters. A total of 30 clusters were covered in the survey. Thirty clusters is regarded as a statistically representative sample of a population by internationally recognized survey designs, such as WHO's EPI cluster sampling design (Turner et al. 1996). The clusters were selected using systematic probability proportionate to size (PPS) sampling procedure. Since the numbers of haors are different in the six districts, a stratified random sampling with proportional allocation was adopted to estimate the number of haors from each district (stratum). About 135 households from each cluster were selected for interviews and the study finally covered 4065 households in total. The household level data was collected during February-May 2009 with the help of a structured interview schedule (questionnaire) conducted by a well-trained group of data collectors. The questionnaire was pretested prior to the survey and modified as appropriate. A number of Focus Group Discussions (FGDs) and Participatory Research Appraisal (PRA) sessions were also conducted in selected haor areas from all six districts.

Analytical techniques

Poverty is defined in many ways, but more generally, it is a lack of

economic and social ability to satisfy socially determined minimum requirements. Poverty, as normally defined, means that the consumption or income level of a person falls below a certain threshold necessary to meet basic needs (Bhuiya et al. 2007). The household level poverty was measured by using both Direct Calorie Intake (DCI) and Cost of Basic Needs (CBN) methods. The depth and severity of household poverty were measured by Foster-Greer-Thorbecke (FGT) method. The coping mechanisms were assessed through perception of the respondents as well as the views of the participants of FGD and PRA sessions.

Direct Calorie Intake (DCI) method

According to the calorie intake method, a household is considered as "hardcore poor" if per capita calorie intake is less than 1,805 Kcal per day, and "absolute poor" if it is less than 2122 Kcal per day (BIDS 1997; BBS 2001). The food items are rice, wheat, pulses, milk, oil, meat, fish, potato, vegetables, sugar and fruits, which provide minimal nutritional requirements corresponding to 2122 Kcal per day per person proposed by BIDS (1997).

Cost of Basic Needs (CBN) method

The cost of basic needs (CBN) approach is used to construct the region-specific poverty line expenditure (BBS 2001; Wodon 2000; 1997; Rahman 1999; Ravallion and Sen 1996). In constructing the food poverty expenditure as a first step, a cost-minimizing long-term diet set with available food items (mentioned in above section) that attain the recommended nutrition level of 2122 kcal per capita per day proposed by BBS (2001) is utilized. In the first step, the required quantities in the food bundle is denoted by (F_1, F_2,...,F_N) to meet the calorie requirement; that is, F_j is the required per capita quantity of the food item j. The food poverty line is computed as $Z_f = SP_jF_j$, where P_j is the unit price of j-th food item. In the second step, two non-food allowances for non-food

consumption were computed. The first was obtained by taking the amount spent on non-food items by those households whose total consumption is equal to their food poverty line Z_f. These households spend less on food than the food poverty line and spend only on the essential items in non-food consumption. Algebraically, if the total per capita consumption is denoted by y and food per capita consumption by x, the "lower" allowances for non-food consumption were estimated as $ZL_n=E[y_i-x_i \mid y_i=Z_f]$, where E denotes the mathematical expectation. The second one, "upper" allowances, was obtained by taking the amount spent on non-food items by those households whose food expenditure was equal to the food poverty line. These households do meet their food requirement comfortably. Mathematically, the "upper" allowances for non-food items can be expressed as $ZU_n=E[y_i-x_i \mid x_i=Z_f]$. Obviously, ZU_n is larger than ZL_n, because the share of food expenditure in total consumption decreases as consumption increases. In the third step, estimation of the poverty lines consisted of adding to the food poverty line with the "lower" and "upper" non-food allowances to yield the total lower and upper poverty lines.

$$\text{Lower poverty line (LPL): } Z_L=Z_f+ZL_n \text{ where } ZL_n=E[y_i-x_i \mid y_i=Z_f] \quad (1)$$

$$\text{Upper poverty line (UPL): } Z_U=Z_f+ZU_n \text{ where } ZU_n=E[y_i-x_i \mid x_i=Z_f] \quad (2)$$

The difference between the two lines is due to the difference in estimation of the allowances for non-food consumption. The LPL incorporates a minimal allowance for non-food goods, while the UPL includes more allowance.

In practice, some adjustments are necessary to estimate ZL_n and Zu_n, because it is not feasible to get desired data whose total consumption was equal to the food poverty line (Z_f) or whose food expenditure was equal to the food poverty line. To avoid this problem, expectation should be taken for those households whose total consumption was less or equal to the food poverty line, in the computation of "lower" allowance for non-food consumption. Similarly, "upper" allowance can be computed

by taking the expectation for those households whose food expenditure was less or equal to the food poverty line.

Poverty Gap and Squared Poverty Gap

The poverty gap and squared poverty gap were estimated using the Foster-Greer-Thorbecke (FGT) method (Poverty Manual 2005). The estimating formulas is given by:

Suppose, N_p is the number of poor of the study population;

N is the total study population;

I (.) is an indicator function that takes on a value 1 if $y_i < z$, and 0 otherwise;

y_i is the household expenditure;

z is the food poverty at household level;

The Head Count Index can be defined as

$$P_0 = \frac{N_p}{N} = \frac{1}{N}\sum_{i=1}^{N} I\,(y_i < z) \tag{3}$$

The Poverty Gap Index can be defined by

$$P_1 = \frac{1}{N}\sum_{i=1}^{N} \frac{G_i}{z} \tag{4}$$

where $G_i = (z - y_i)$. $I\,(y_i < z)$ is known as poverty gap score.

The Squared Poverty Gap Index can be obtained as

$$P_2 = \frac{1}{N}\sum_{i=1}^{N} \left(\frac{G_i}{z}\right)^2 \tag{5}$$

Results and Discussion

The incidence of poverty varies across regions due to external factors such as social and economic opportunities. The minimum requirement, expressed as poverty line expenditure, is commonly measured by income/expenditure or calorie intake. Moreover, in a

multi-dimensional approach, income or calorie intake is measured against other variables such as, health and sanitation, housing condition, security, public distribution system, participation in development and social welfare activities. The following sections present different estimates of poverty of the haor households and illustrate their differentials on the basis of some selected socio-economic criteria.

An attempt was also made to compare our results with the Household Income and Expenditure Survey (HIES) 2010 (BBS 2011). The HIES is based on nationally representative sampling procedure and also use the same DCI and CBN method for estimating poverty and utilizes both LPL and UPL criteria, although specific details of computing these figures may be different. We used information for the rural areas only from HIES 2010 for comparison.

Socio-economic profile of the study areas

Table 1 below presents selected socio-economic profile of the sample households of the haor areas including a comparison of these indicators with those of HIES 2010. Table 1 shows that the sex ratio, dependency ratio and family size is higher in the study areas compared to the national average for rural areas as indicated in HIES 2010. However, the literacy rate is remarkably similar. The incidence of landlessness is substantially higher in the study areas than the national average, as expected. Even the proportion of large farmers is substantially lower (Table 1). The overall per capita monthly income of these haor residents is estimated at BDT 1,348.62 which 36.6% lower than the national average of BDT 2,130 and rather closer to the income of poor residing within the Sylhet and Dhaka divisions where all these haor areas are located (Table 1). The decile distribution of the share of per capita monthly income is almost similar to the national average for rural areas of Bangladesh.

Table 1.
Demographic and socio-economic profile of the study areas

Items	Unit	Study area	HIES 2010
Demographics			
Proportion of male	%	51.53	49.37
Proportion of female	%	48.47	50.62
Sex ratio		94.33	97.54
Dependency ratio		83.78	78.10
Average household size	Persons	5.39	4.53
Literacy (7 years and over)			
Illiterate	%	46.05	46.63
Literate	%	53.95	53.37
Literate in Sylhet division	%	--	52.46
Literate in Dhaka division	%	--	49.00
Agricultural land ownership (in decimals)			
0.00 – 0.49	%	74.00	59.20
0.50 – 0,99	%	8.90	14.20
1.00 and above	%	17.10	26.60
Income			
Per capita monthly income (all households)	BDT	1348.62	2130.00
Per capita income of the poor in Sylhet (Lower)	BDT	--	1000.87
Per capita income of the poor in Sylhet (Upper)	BDT	--	1045.20
Per capita income of the poor in Dhaka (Lower)	BDT	--	1106.74
Per capita income of the poor in Dhaka (Upper)	BDT	--	1237.02
Share of income by decile group			
Bottom 5%	%	0.91	0.88
Decile 1	%	2.22	2.23
Decile 2	%	5.51	3.53
Decile 3	%	2.37	4.49
Decile 4	%	5.17	5.43
Decile 5	%	7.55	6.43
Decile 6	%	6.74	7.65
Decile 7	%	8.43	9.31
Decile 8	%	11.47	11.50
Decile 9	%	15.90	15.54
Decile 10	%	34.63	35.85
Top 5%	%	23.12	24.61

Note: HIES 2010 data are for rural areas unless specified.

Poverty estimation using CBN method

It is documented that an adult person in Bangladesh requires an average minimum amount of 832 gm of food a day, which is converted to 2122 Kcal of energy (BIDS 1997). The food combination suggested by BIDS study was 397 gm of rice, 40 gm of wheat, 40 gm of pulse, 58 gm of milk, 20 gm of oil, 12 gm of meat, 48 gm of fish, 27 gm potato, 150 gm of vegetables, 20 gm of sugar and 20 gm of fruits. In practice, rural people are dependent more on rice than on other items. Later, BBS has used a larger combination of food and per capita per day intake of rice at 455 gm (BBS 2000). The per capita per day food combination for this study was prepared by considering the combinations suggested by BBS (2000) and BIDS (1997).

The per capita daily intake of food, calorie contents and price of food for the study population are presented in Table 2. In the estimation, the per capita per day requirement of food intake was fixed as 824 grams containing 448 grams of rice, which cost BDT 25.6 at the time of survey. The corresponding average calorie intake is estimated at 2104 kcal/capita/day.

Table 2.
Per capita per day requirements of food intake, price of food and calorie contents

Food Items	Per Capita per day intake (in gram)	Total Calorie Content	Calorie Content per gram	Average price (kg)	Average price of required quantity (Pj*Fj)
Cereals					
Rice	448.00	1576.96	3.5200	25.35	11.3568
Wheat	36.56	125.06	3.4206	25.81	0.9436
Pulses					
Masoor	7.53	25.84	3.4316	96.76	0.7286
Mash Kalai	1.94	6.52	3.3608	48.2	0.0935
Khesari	6.00	20.71	3.4517	64.89	0.3893

Fruits	20.00	18.58	0.9291	73.14	1.4628
Vegetables					
Potato	61.19	59.36	0.9701	16.26	0.9949
Leafy vegetables	72.37	47.01	0.6496	16.3	1.1796
others	57.26	18.95	0.3309	14	0.8016
Milk	29.70	22.19	0.7471	30	0.8910
Edible Oils	8.63	77.73	9.0073	88.75	0.7659
Meat, Fish and Eggs					
Mutton	0.69	0.82	1.1884	204	0.1408
Beef	4.98	5.67	1.1386	203	1.0109
Chicken/duck	3.96	4.75	1.1995	137	0.5425
Fishes	29.09	33.30	1.1447	84.17	2.4485
eggs	3.20	5.58	1.7438	200	0.6400
Spices					
Onion	19.74	9.87	0.5000	31.46	0.6210
Others	6.61	17.24	2.6082	43.12	0.2850
Sugar and Molasses	7.00	27.87	3.9820	37.66	0.2636
Total	**824.45**	**2104.02**			**25.5602**

Note: Exchange rate: USD 1 = BDT 69.04 in 2009 (BB, 2010). HIES 2010 data are for rural areas unless specified.

Using the food combination and price presented in Table 2, the food poverty line was estimated as BDT 9329.4 per capita per year (Table 3). The annual per capita "lower" and "upper" non-food allowances was as BDT 1230.0 and BDT 3383.8 respectively, which were 13.2% and 36.3% of the food expenditure. The corresponding per capita LPL and UPL were estimated as BDT 10559.4 and BDT 12713.2, respectively (Table 3). The non-food expenditure was found consistent with other studies of Bangladesh ranging between 30–40% (e.g., Rahman 1999; Ravallion & Sen 1996; Rahman 1994).

Classifying the household income based on the aforementioned thresholds revealed that 29.6% of the total households lie below the lower poverty line and 43.0% below the upper poverty line. The incidence of poverty in the study population was found to be substantially higher than the national average for the rural areas as revealed from the HIES 2010 (Table 3).

Table 3.
Estimation of the poverty line expenditures per capita and per household estimated by CBN Method

Poverty line categories	BDT	HIES 2010
Per capita Food Poverty Line (Z_f)*	9329.40	
Per capita lower allowance (ZL_n)**	1230.00	
Per capita upper allowance (ZU_n)**	3383.82	
Per capita lower poverty line ($ZL= Z_f + ZL_n$)	10559.40	
Per capita upper poverty line ($ZU= Z_f + ZU_n$)	12713.22	
Head count ratio	Percentage of population	
Households below the lower poverty line expenditure	29.60	21.10
Households below the upper poverty line expenditure	43.00	35.20

Note: *The food poverty line is estimated by considering the price for the annual food quantity of minimal nutritional requirements corresponding to 2,122 kcal per day per person.
** ZLn=E[yi-xi | yi=Zf] and ZUn=E[yi-xi | xi=Zf], where y denotes the total per capita consumption; x denotes the food per capita consumption and Zf denotes the food poverty line.
Exchange rate: USD 1 = BDT 69.04 in 2009 (BB, 2010)
HIES 2010 data are for rural areas unless specified.

Poverty estimation using Direct Calorie Intake (DCI) method

Considering the average household consumption of food during the last three days prior to the survey, the average per capita calorie intake was estimated as 2237.0 Kcal (Table 4). This estimated actual calorie intake is 4.6% lower than the national average for the rural areas of 2344.6 Kcal estimated by HIES 2010 (Table 4). However, the average per capita intake of calorie was estimated at 1578.5 Kcal and 1799.3 Kcal for the households below the hardcore and absolute poverty lines, respectively, which are substantially lower than the minimum requirement of 2104 Kcal as presented in Table 2.

Table 4.
Estimation of the extent of poverty at the household level by DCI method

Categories	Energy (Kcal)	HIES 2010
Per capita average intake of calorie	2237.01	2344.60
Per capita average intake of calorie below hardcore poverty line	1578.54	
Per capita average intake of calorie below absolute poverty line	1799.30	
Head count ratio	Percentage of population	
Households below hardcore poverty line	18.13	
Households below absolute poverty line	40.22	

Note: HIES 2010 data are for rural areas unless specified.

Based on this DCI method, the head count ratio indicates that 18.1% of the households fell below the hardcore poverty line and 40.2% of the households below the absolute poverty line, which is quite alarming by any standard.

Differentials of poverty by selected socio-economic characteristics

Table 5 presents the distribution of poverty levels by selected socio-economic characteristics, such as: landholdings, occupation and education of the household head, possession of durable assets, housing condition, sanitation facilities, NGO membership and geographical location. The result suggests that the proportion of households below the lower poverty line was almost identical in all districts under study. The difference in the incidence of poverty between the districts are much higher when the upper poverty line was considered. For example, the proportion of poor households is highest (48% of total) in Kishoregonj district and lowest (38% of total) in "other districts of Sylhet division". These poverty estimates of haor areas are much higher than the district level overall poverty figures reported by HIES 2010 as well as the World Bank (2011) which confirms that poverty in disadvantaged pockets of Bangladesh—which are not clearly known to the policy maker—are substantially higher .

Table 5.
Differentials of poverty using CBN Method according to selected characteristics

Characteristics	% of HHs below lower poverty line	% of HHs below upper poverty line	HIES 2010LPL	HIES 2010UPL
District			21.10	35.20
Sunamgonj	30.10	40.40		
Other districts of Sylhet Division.	29.60	38.00	23.50[a]	30.50a
Kishoregonj	29.80	48.00	23.50[b]	38.80b
Netrokona	30.20	39.40		
Size of landholdings[c]				
None	38.10	50.70	33.80	47.50
01-49 decimal	30.30	42.80	22.10	33.80
50-199 decimal	18.80	40.60	15.20	27.70
200 decimal or more	7.30	29.90	8.60	15.70
Occupation of Household Head				
Agriculture (owner)	19.00	38.30	22.50	36.80
Business	29.90	41.80		
Fisherman	26.90	36.70	22.50	36.80
Agri-labourer	34.70	45.10		
Non-agri labourer	36.40	48.00		
Job/Service	22.50	37.30	30.90	49.10
Others	34.50	44.90		
Education of the Household Head				
No education	31.60	43.70	27.20	43.50
1-5 years of schooling	28.30	40.20	18.40	38.10
6+ years of schooling	23.90	39.30	19.90	36.10
Family Size[d]				
1-3	10.10	21.70	9.30	18.00
4-6	19.90	37.70	23.40	38.80
7 & above	28.00	44.30	32.50	47.00
Durable Assets				
No asset (score=0)	42.20	50.00		
Poor assets (score 1-2)	32.60	44.80		
Few assets (score 3-10)	26.40	40.70		
Countable assets (score 11-74)	16.60	36.10		
Housing Condition				
Straw roof and bamboo/muddy wall	35.70	48.10		

Tin shed roof and muddy wall	29.90	41.40
Tin shed roof and tin wall	23.50	42.30
Semi-pucca	20.60	34.40
Others	38.60	54.40
Sanitation Facilities		
Sanitary toilet	28.70	43.40
Pit/*pucca* toilet	26.30	39.00
Katcha toilet	29.10	44.20
Open field/ Others	33.00	44.10
NGO Membership		
Yes	29.70	49.00
No	25.30	38.80

Note: HIES 2010 data are for rural areas unless specified.
a = Sylhet division
b = Dhaka division
c = Landholding classification in HIES 2010 are No land; 0.05−0.49; 0.50−1.49; 1.50−2.49; 2.50 and above.
d = Family size classification in HIES 2010 are 1−2 persons, 5−6 persons and 7+ persons.

Landholding was found to be inversely correlated with poverty. About 38% of the absolute landless households fell below lower poverty line, whereas for the medium landholding households (200 decimals or more), the figure was only 7.3%. Similarly, the incidence of poverty was striking high for the labor-headed households as nearly half of them fell below the upper poverty line. These poverty figures are substantially higher than those reported by HIES 2010 (Table 5).

The incidence of poverty was found to be lower for the households whose heads were engaged in agriculture and/or jobs/services. The figures are similar for agriculture but higher for jobs/services as reported by HIES 2010 (Table 5).

The incidence of poverty also varies according to the literacy level of the household heads. Poverty is similar and high for illiterate and heads educated up to primary but lower for educated heads above primary level. When upper poverty line is considered, the incidence of poverty becomes even higher as expected. Further, all these figures are substantially higher than those reported by HIES 2010 (Table 5), which

again establishes disadvantages of these haor households.

Family size is positively correlated with the incidence of poverty. For example, 44% of the larger households fell below the upper poverty line (7+ members), but it was only 22% for the smaller households (1-3 members). However, these figures are not very different from those reported by HIES 2010 (Table 5).

As expected, the incidence of poverty decreases with increase in the stock of durable assets. About 42% of the households who had no asset score were found to fall below the lower poverty line, whereas the figure was 17% for the households with assets.

The incidences of poverty also vary according to the housing condition as well as sanitation facilities. The proportion of households falling below the poverty line decreases as the housing condition and sanitation facilities improves.

Finally, the incidence of poverty was substantially higher at 49% for the households who were the member of any NGO than among the non-member households estimated as 38.8%, which indicates that the NGOs are perhaps targeting the poor correctly.

Poverty Gap and Squared Poverty Gap

The poverty gap and squared poverty gap was computed using Eqs. 4 and 5 using the lower and upper poverty lines from CBN method. The results are presented in Table 6. The value of the poverty gap reflects the depth of poverty of the sampled households, i.e., the higher the value, the deeper is the poverty. Using the lower and upper poverty lines, the overall poverty gaps were estimated as 7.6% and 12.4%, respectively. These figures are substantially higher than the national average for the rural areas as well as within the Sylhet and Dhaka divisions as reported by HIES 2010 (Table 6) and 6.5% for overall Bangladesh in 2015 (PC 2015), which confirms that the depth of poverty is high in these disadvantaged pockets of the nation. These values of poverty gaps can be used to estimate the total budget to raise the poor households out of

poverty defined by the poverty lines.[2]

Table 6.
Poverty Gap and Squared Poverty Gap by FGT Method using the Lower and Upper Poverty Lines of CBN Estimation (in percent)

	Poverty Gap (%)				Squared Poverty Gap (%)			
	Study area		HIES 2010		Study area		HIES 2010	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Overall	7.8	12.4	3.7	7.4	3.0	5.2	1.0	2.2
District								
Sunamgonj	6.8	1.1			2.7	4.7		
Other Districts of Sylhet	6.1	10.8	3.7a	5.0a	2.4	4.3	1.0a	1.3a
Kishoregonj	7.5	12.2	4.1b	8.1b	3.1	5.2	1.1b	2.4b
Netrokona	10.2	16.1			3.9	6.8		
Occupation of Household Head								
Agriculture (owner)	2.1	4.4			0.7	1.5		
Business & Service	6.6	11.1			2.6	4.6		
Fisherman	6.1	11.9			1.9	4.2		
Agri-labourer	11.2	18.1			4.2	7.5		
Non-agri labourer	12.6	19.1			4.5	7.9		
Others	12.6	17.9			6.1	9.0		

Note: HIES 2010 data are for its rural areas unless specified.
a = Sylhet division
b = Dhaka division

[2] The result illustrates that if on an average (for the whole sample) 7.6% cost of the lower poverty line is budgeted as transfers and properly distributed to the targeted poor households, they would be able to come out from the lower poverty line, i.e. the poverty of the sample *haor* population (estimated on the basis of the lower poverty line) will be eliminated. It is estimated that BDT .17,522,911 (7.6% × lower poverty linee xpenditure × total sampled households) is required for the sampled poor households to bring them out of poverty measured by lower poverty line. A similar explanation applies for the upper poverty line with a much higher level of investment required.

The overall squared poverty gaps were estimated at 3.0% and 5.2% for the corresponding lower and upper poverty lines, measuring the severity of the poverty. The higher the value of the squared poverty gap, the more severe is the poverty position of the population under consideration. Again, these figures are substantially higher than those reported by HIES 2010 (Table 6), which reestablishes that the severity of poverty of the haor population is much higher than the overall rural population of Bangladesh.

Table 6 also presents the depth and severity of poverty by location and occupation of the household head. Households of Netrokona and Kishorgonj districts are worse than those of other surveyed districts in terms of depth and severity of poverty. The depth and severity of poverty is also highest for wage labor households as compared to other occupational categories.

Coping strategies

Poverty stricken households always try to cope with the situation by adopting various strategies. Two types of coping strategies are usually adopted by the victims of poverty: first to address the issue in the short-run which can be termed as immediate measures and second to tackle it in the long-run termed as general coping strategies.

The question on coping strategies were directed to the respondents who reported to have suffered from food insecurity (i.e., were anxious about sufficient food) during the three months prior to the survey. As a result, a total of 1825 heads were asked about their coping strategies to tackle poverty and food insecurity. The results are presented in Figure 1. About 84.1% of the respondents admitted to resorting to loans for buying food, followed by 66.7% reporting "reduction of familial expenses" followed by 60.2% reporting "borrowing food items from relatives and kin". Selling household assets as a measure of tackling poverty and food insecurity is minimal, mostly likely due to limited ownership of the assets by these households as shown in Table 5.

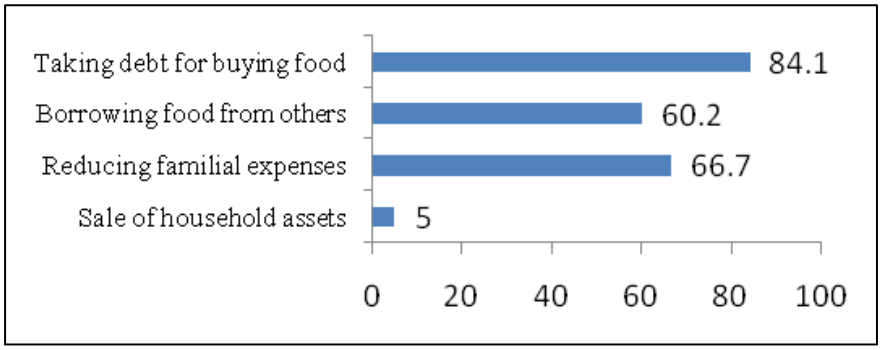

Figure 1. Immediate Coping Strategies.

The respondents were also asked about the strategies they usually adopt to cope with poverty and food insecurity at different times over their life span (Figure 2). Again, 79.3% of the respondents reiterated their reliance upon "borrowing money" for coping with poverty and food insecurity problems followed by "reducing food cost" (55.3%) and "help from relatives" (42.4%). Internal out-migration, which is an optimistic strategy, was also undertaken by a considerable number (18.5%) of respondents. Also, a large proportion of respondents relied on "help from communal leaders" (20.7%) and "from NGOs" (9.4%) to cope with long term poverty.

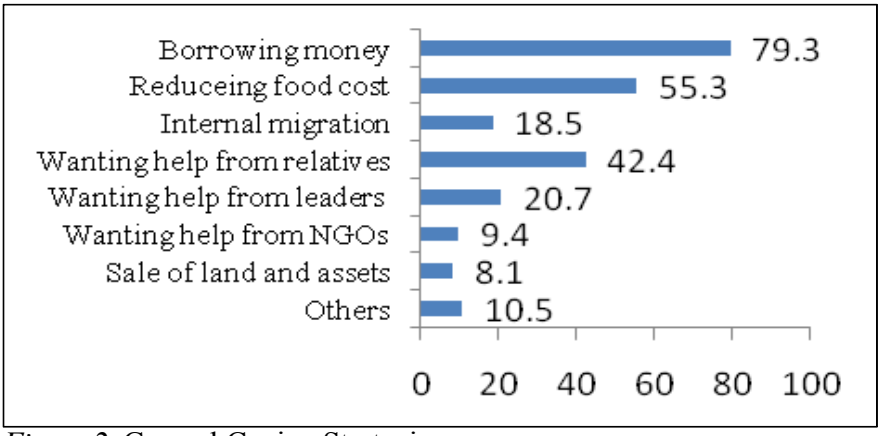

Figure 2. General Coping Strategies.

Necessary measures to tackle poverty and food insecurity

The respondents were invited to express their opinions regarding actions/measures needed to reduce poverty and food insecurity in their areas and the results are presented in Table 7. Over three-fourths of the respondents strongly opted for "government support programs", followed by 67.8% emphasizing the "need for additional work opportunities for all seasons" and 46.2% advocated for "provision of funds for alternative income generating activities".

Table 7.
Necessary measures taken to reduce poverty and food insecurity

Necessary measures	No. of Households	% of Households
Ensuring work opportunity in all seasons	1238	67.8
Introducing food bank to ensure food security during crisis period	681	37.3
Providing fund for alternative IGA	843	46.2
Membership under the safety net food program	732	40.1
NGOs should adopt appropriate action for tackling the situation	672	36.8
Government support program is a must	1383	75.8
Others	102	5.6
Total number of households	1825	

Conclusions and Policy Implications

The study is aimed at examining incidence, depth and severity of poverty, its correlates and coping strategies undertaken by a sample of 4,065 hoar households who were among the most vulnerable portion of the population in Bangladesh. Results revealed that a substantially high proportion of surveyed households were below the area-specific poverty line and the depth and severity of poverty were also much higher than the comparable national and the regional estimates of poverty, depth and severity which confirms the vulnerability and disadvantaged position of these haor residents in society. As expected, the incidence of poverty is lower when a DCI method was used as compared to the CBN method.

The incidence of poverty at the household level varied according to selected socio-economic characteristics. The incidence of poverty is higher for households characterized with landlessness, large family size, lack of durable assets, poor housing and sanitation, NGO membership and whose heads are illiterate and employed as wage laborers. Furthermore, the depth and the severity of poverty were higher for the labor-headed households. Geographical location also has an influence on poverty as the depth and the severity of poverty was higher for haor households of the Netrokona and Kishoregonj districts as compared to other four districts.

The major coping strategies reported by the respondents were "borrowing money and food", "reducing familial expenses" and "internal out-migration". The adopted general coping strategies were not different between the poor and the non-poor households. When asked what measures/options are needed for tackling poverty in these haor areas, the majority of the respondents emphasized "government support programs", "creation of employment for all seasons" and "financing income generating activities".

Policy implications

The following policy implications can be drawn from the results of this study. First, the high level of landlessness needs to be addressed as it is directly linked to incidence of poverty (Table 5). Therefore, land reform and tenurial policies aimed at effective functioning of the land rental market should be emphasized so that these landless households can participate in agricultural occupations that reduce poverty. This is because a traditional land redistribution policy is not feasible in the context of Bangladesh because of the nature of socio-economic constraints and political economy in the country (Rahman & Rahman 2008). But smooth functioning of existing tenancy regulations will improve farm operation size. Second is investments in the creation of alternative income generating activities as emphasized by the

households. Income generating activities such as handicrafts, tailoring, embroidering, poultry and livestock rearing can be promoted through targeted provision of appropriate skills training and choice of enterprises according to the facilities available in the locality so that these households can earn income and remain employed throughout the year. In this regard, participation of different NGOs can be encouraged and public-private partnership arrangements can also be useful. Also, government can try to introduce an employment insurance scheme during the lean season as noted by Ghosh et al. (2000) and Mobarak and Rosenzweig (2014). Third, establish and/or increase the coverage of financial institutions, particularly the micro-credit model of financing, to operate in the haor areas in order to reduce the dependency of these households on exploitative money lenders . Thrust should be on facilitating collateral free micro-credit schemes operated by large NGOs (e.g., BRAC, Proshika, ASA, etc.) which is different from the conventional bank credits requiring collateral that these haor residents lack. Fourth, investment in education targeted at the haor areas in order to develop human capital and skills, which will enhance employment and income earning opportunities. This is because education is inversely related to poverty as evidenced in Table 5. And finally, it is important to increase the coverage of safety net programs of the government in the haor areas while ensuring effective selection of deserving households and distribution of relief materials. This is particularly relevant in coping with emergencies.

Although the challenge to realize all these policy measures are formidable, there is an urgent need to address the higher than national level of observed poverty, its depth and severity in these haor areas, so that Bangladesh successfully achieves the new SD21 Goal 1 of "eliminating poverty everywhere" by 2030.

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